

What is Claimed is:

1. A method of making a surface covering which comprises the sequential steps of:

- (a) applying over a substrate a plastic layer containing a foaming agent,
- (b) heating the plastic layer to a temperature which gells the plastic layer without activating the foaming agent to form a gelled plastic layer having a surface,
- (c) applying to the surface of the gelled plastic layer a first printing ink containing a photoinitiator in a first pattern or a first design,
- (d) applying to the surface of the gelled plastic layer a second printing ink containing a photoinitiator and an expansion inhibitor in a second pattern or a second design,
- (e) applying a curable coating over the gelled plastic layer and the first and second printing inks,
- (f) gelling the curable coating,
- (g) heating to soften the gelled curable coating,
- (h) mechanically embossing the softened curable coating,
- (i) activating the photoinitiator and curing the surface areas of the curable coating disposed over the first and second printing inks,
- (j) heating to activate the foaming agent and fuse the curable coating, the plastic layer and the substrate together, wherein foaming of the plastic layer underlying the second printing ink is inhibited, and the mechanical embossing in

surface areas disposed over unprinted areas is relaxed,

(k) optionally mechanically embossing the curable coating in areas that are not disposed over the first and second printing inks.

2. The method of claim 1 wherein the curable coating is cured following fusion by subjecting the surface covering to electron beam radiation.

3. The method of claim 2 wherein the surface covering is subjected to electron beam radiation following mechanical embossing in step (k).

4. The method of claim 1 wherein the curable coating contains a thermal crosslinking initiator and the curable coating is cured by heat during fusion.

5. The method of claim 1, further comprising applying a polyurethane coating after optionally mechanically embossing.

6. The method of claim 1, wherein the surface covering is selected from the group consisting of sheet flooring, tile and wall covering.

7. The method of claim 1, wherein the surface covering is cooled prior to heating to soften the gelled curable coating.

8. The method of claim 1, wherein the surface covering is cooled and then the surface is reheated to soften it prior to optionally mechanically embossing.

9. The method of claim 1, wherein after gelling the plastic layer the surface covering is cooled prior to applying the printing ink.

10. The method of claim 1, wherein said curable coating contains a thermal crosslinking initiator.

11. The method of claim 7, wherein said thermal crosslinking initiator is peroxide.

12. The method of claim 8, wherein said curable coating contains solid particulates.

13. The method of claim 1, further comprising applying one or more than one additional printing ink(s) to the surface of the gelled plastic layer.

14. The method of claim 13, wherein one or more than one of said additional printing ink(s) contains a photoinitiator.

15. The method of claim 13, wherein one or more than one of said additional printing ink(s) contains an inhibitor.

16. The method of claim 14, wherein one or more than one of said additional printing inks containing a photoinitiator also contains an inhibitor.

17. A method of making a surface covering which comprises the sequential steps of:

- (a) applying a plastic layer over a substrate,
- (b) heating the plastic layer to a temperature which gells the plastic layer,
- (c) applying a printing ink containing a photoinitiator onto the gelled plastic layer in a pattern or a design,
- (d) applying a curable coating over the gelled plastic layer and the printing ink,
- (e) gelling the curable coating,
- (f) heating to soften the gelled curable coating,
- (g) mechanically embossing the softened curable coating,

- (h) activating the photoinitiator and curing the curable coating disposed over the printing ink,
- (i) heating to cure uncured portions of the curable coating and fuse the thereby cured coating, the plastic layer and the substrate together.

18. The method of claim 17 further comprising mechanically embossing the cured coating in areas that are not disposed over the printing ink.

19. The method of claim 17, further comprising applying a polyurethane coating after mechanically embossing the cured coating that is uncured.

20. The method of claim 17, wherein the surface covering is selected from the group consisting of sheet flooring, tile and wall covering.

21. The method of claim 17, wherein the surface covering is cooled prior to curing the curable coating.

22. The method of claim 17, wherein the surface covering is cooled following curing the curable coating.

23. The method of claim 17, wherein after gelling the plastic layer the surface covering is cooled prior to applying the printing ink.

24. The method of claim 17, wherein said curable coating contains a thermal crosslinking initiator.

25. The method of claim 17, wherein said thermal crosslinking initiator is peroxide.

26. The method of claim 17, wherein said curable coating contains solid particulates.

27. The method of claim 17, further comprising applying one or more than one

additional printing ink(s) onto the gelled plastic layer before applying said curable coating.

28. The method of claim 27, wherein one or more than one of said additional printing ink(s) contains a photoinitiator and/or an inhibitor.

29. The method of claim 17 wherein the curable coating comprises a curable acrylic monomer and/or oligomer.

30. The method of claim 17 wherein the plastic layer contains a foaming or blowing agent, one or more than one printing ink(s) further contains an inhibitor, heating to gel the plastic layer is not sufficient to activate the foaming or blowing agent, and heating in step (i) is sufficient to activate the foaming or blowing agent and relax the mechanical embossing in surface areas disposed over areas not printed with an ink comprising a photoinitiator.

31.

A surface covering which comprises:

- (a) a substrate,
- (b) a foamed and chemically embossed plastic layer overlaying the substrate,
- (c) an ink containing a photoinitiator printed in a design on said foamed plastic layer,
- (d) a cured coating or a cured layer overlaying the foamed plastic layer and ink wherein the portion of the cured coating or the cured layer disposed over the ink is chemically and mechanically embossed.

32. The surface covering of claim 31 wherein the ink also contains an inhibitor.

33. The surface covering of claim 31 wherein the portion of the cured coating or cured layer which is not disposed over the ink is mechanically embossed with a texture different from the mechanically embossed portion of the cured coating disposed over the ink.

34. The surface covering of claim 31 further comprising a polyurethane coating overlaying the cured coating or cured layer.

35. A surface covering which comprises:

- (a) a substrate,
- (b) a plastic layer overlaying the substrate,
- (c) an ink containing a photoinitiator printed in a design on said plastic layer,
- (d) a cured coating or a cured layer overlaying the plastic layer and the ink wherein the cured coating or the cured layer overlaying the ink is mechanically embossed.

36. The surface covering of claim 35 further comprising a polyurethane coating overlaying the cured and embossed cured coating or cured layer.

37. A method of making a surface covering which comprises the sequential steps of:

- (a) applying over a substrate a plastic layer containing a foaming agent,
- (b) applying to the surface of the plastic layer a first printing ink containing a photoinitiator in a first pattern or a first design,
- (c) applying to the surface of the gelled plastic layer a second printing

ink containing a photoinitiator and an expansion inhibitor in a second pattern or a second design,

(d) applying a curable layer over the plastic layer and the first and second printing inks,

(e) heating to soften the curable layer,

(f) mechanically embossing the softened curable layer,

(g) activating the photoinitiator and curing the surface areas of the curable layer disposed over the first and second printing inks,

(h) heating to activate the foaming agent, cure uncured portions of the curable layer, wherein foaming of the plastic layer underlying the second printing ink is inhibited, and the mechanical embossing in surface areas disposed over unprinted areas is relaxed,

(i) optionally mechanically embossing the cured coating in areas that are not disposed over the first and second printing inks.

38. The method of claim 37, further comprising applying a polyurethane coating after optionally mechanically embossing.

39. The method of claim 37, further comprising applying additional printing ink(s) after application of said second printing ink and before applying said plastisol coating.

40. The method of claim 37 wherein the plastic layer is applied as a liquid followed by heating the plastic layer to a temperature which gels the plastic layer without activity the foaming agent to form a gelled plastic layer having a surface.

41. The method of claim 37 wherein the plastic layer is adhered over the

substrate.

42. The method of claim 41 wherein the plastic layer is adhered by laminating.

43. The method of claim 37 wherein the curable layer is applied as a liquid followed by gelling the curable layer.

44. The method of claim 37 wherein the curable layer is adhered over the plastic layer and the first and second printing inks.

45. The method of claim 44 wherein the curable layer is adhered by laminating.

cv. 156

2025 RELEASE UNDER E.O. 14176